REPORT OF SURVEY CONDUCTED AT

SIERRA ARMY DEPOT
HERLONG, CA

JULY 1998

Best Manufacturing Practices

1998 Award Winner

INNOVATIONS IN AMERICAN GOVERNMENT

BEST MANUFACTURING PRACTICES CENTER OF EXCELLENCE
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Foreword

This report was produced by the Best Manufacturing Practices (BMP) program, a unique industry and government cooperative technology transfer effort that improves the competitiveness of America's industrial base both here and abroad. Our main goal at BMP is to increase the quality, reliability, and maintainability of goods produced by American firms. The primary objective toward this goal is simple: to identify best practices, document them, and then encourage industry and government to share information about them.

The BMP program set out in 1985 to help businesses by identifying, researching, and promoting exceptional manufacturing practices, methods, and procedures in design, test, production, facilities, logistics, and management – all areas which are highlighted in the Department of Defense's 4245-7.M, *Transition from Development to Production* manual. By fostering the sharing of information across industry lines, BMP has become a resource in helping companies identify their weak areas and examine how other companies have improved similar situations. This sharing of ideas allows companies to learn from others' attempts and to avoid costly and time-consuming duplication.

BMP identifies and documents best practices by conducting in-depth, voluntary surveys such as this one at Sierra Army Depot conducted during the week of July 20, 1998. Teams of BMP experts work hand-in-hand on-site with the activity to examine existing practices, uncover best practices, and identify areas for even better practices.

The final survey report, which details the findings, is distributed electronically and in hard copy to thousands of representatives from government, industry, and academia throughout the U.S. and Canada – *so the knowledge can be shared.* BMP also distributes this information through several interactive services which include CD-ROMs, BMPnet, and a World Wide Web Home Page located on the Internet at http://www.bmpcoe.org. The actual exchange of detailed data is between companies at their discretion.

Sierra Army Depot is a government owned, government operated installation, functioning as part of the U.S. Army Industrial Operations Command, Rock Island Illinois. Its mission is to provide customers with high quality, cost effective operations in receipt, storage, repair, and issue of equipment and components for Operational Project Stock. Among the best examples were Sierra Army Depot's Superstacker, Container Rotator, and Depot Integrated Budget System.

The Best Manufacturing Practices program is committed to strengthening the U.S. industrial base. Survey findings in reports such as this one on Sierra Army Depot expand BMP's contribution toward its goal of a stronger, more competitive, globally-minded, and environmentally-conscious America.

I encourage your participation and use of this unique resource.

Ernie Renner

Director, Best Manufacturing Practices

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Section 1

Report Summary

Background

Sierra Army Depot (SIAD) is a government owned, government operated installation, functioning as part of the U. S. Army Industrial Operations Command, Rock Island, Illinois. SIAD is located in Herlong, California, in Lassen County's Honey Lake Valley, east of the Sierra Nevada mountains. SIAD's mission is to provide customers with high quality, cost effective operations in receipt, storage, repair, and issue of equipment and components for Operational Project Stock. SIAD also receives, stores, issues, maintains, and demilitarizes conventional ammunition.

SIAD currently employees a workforce of 569 people. The Depot has 1,177 buildings totaling 5,518,516 square feet of floor space, and covers an area of 96,792 acres. SIAD has more than 3.6 million square feet of improved hardstand storage areas. Having ample storage space with virtually unlimited room to expand for future projects, SIAD provides free asset storage for active customers.

In 1993, SIAD was designated as the Army's Center of Technical Excellence for Operational Project Stocks. SIAD is home to the three largest Operational Project Stocks in the Army: Inland Petroleum Distribution System, Water Support System, and Force Provider. In addition, SIAD is home for other Operational Project Stocks including: Deployable Medical Systems - Non-Medical Equipment, Army Field Feeding Systems, Large Area Maintenance Shelters, Landing Mat Sets, and Bridging.

SIAD was awarded the Value Engineering Commander's Excellence Award for government owned, government operated facilities in fiscal year 1998. SIAD earned the award for exceeding the Value Engineering program goal by 270%, for a total cost savings of $3,773,000. Another of SIAD's efforts resulted in the design and building of container rotation devices which significantly reduced the costs associated with container movement through each repair station.

SIAD's high-desert location provides ideal conditions for storing Operational Project Stocks for extended periods of time. Pacific air that moves into the region loses most of its moisture before reaching the Honey Lake Valley, resulting in an average yearly high temperature of 66.9 degrees and a low of 36.4 degrees. Average yearly precipitation is 7.49 inches, with an average yearly humidity of only 30.96. SIAD has ready access to all west coast ports. The Depot is connected by several all-weather highways, has an internal rail system linked with two transcontinental rail lines, and has a 7,100-foot runway that accommodates up to C5A aircraft.

Repair facilities located at SIAD include the management of the Inland Petroleum Distribution Systems; Water Support Systems; Force Provider; Army Field Feeding Systems; Large Area Maintenance Shelters; Landing Mat Sets; Bridging; and Reserve Component Hospital Detachment Associated Support Items of Equipment (non-medical). The activities at SIAD include receipt, storage, and care of supplies in storage, repair, assembly, disassembly, and shipment of major and secondary items for all systems.

SIAD also receives, issues, stores, renovates, and demilitarizes (destroys) ammunition. Since the decision of the Base Realignment and Closure Commission in 1995 to realign the Depot's ammunition functions, most operations involve the disposal of obsolete or outdated munitions. Three facilities are identified specifically for demilitarization of ammunition at SIAD. The deactivation furnace is an incinerator that can demilitarize small arms ammunition, primers, fuses, and boosters. The Depot has approval from the state of California to demilitarize up to 0.50 caliber rounds in the deactivation furnace. As such, two general purpose buildings are used to download and pull apart ammunition for demilitarization. They are equipped with intrusion detection systems and rapid response deluge systems for safety.

SIAD is licensed by the Nuclear Regulatory Commission to receive, store, issue, renovate, and demilitarize (disassemble) depleted uranium rounds. SIAD has the largest open burn/open detonation capacity in the United States. Fourteen pits, permitted by the state of California, can detonate up to 10,000 pounds net explosive weight per pit. The Depot's demilitarize grounds are also able to burn materials up to 100,000 pounds net explosive weight. The open detonation pits are also used to dispose of large rocket motors with a 160,000-pound net explosive weight capacity for the pit area. The large open-burn/open-detonation capability of the Depot provides the Department of Defense and government contractors with the ability to destroy large rocket motors at a lower cost than any

other location. SIAD takes every step possible to be a good neighbor and operates under all local, state, and federal Environmental Protection Agency regulations to get the job done with minimal environmental impact.

Best Practices

The following best practices were documented at SIAD:

Item	Page
Container Rotator	**5**

SIAD designs and manufactures container rotators to improve its ability to perform repair of International Standards Organization shelters used in the storage and shipment of Operational Stock sets, kits, and outfits. The Depot has a patent pending on the design and has built container rotators for outside customers.

Demilitarization Robot **6**

SIAD obtained a High Agility Ground Accessible Robot for use in demilitarization operations of explosives and propellants. Use of the High Agility Ground Accessible Robot has greatly improved operational safety and employee confidence.

Automated Scales **6**

SIAD employs the use of an automated scale to efficiently process a high volume of equipment containers. The automated scale accurately provides container weight and center of balance locations. Orientation of the container on the scale does not affect the accuracy.

Superstacker **7**

SIAD procured two Superstacker cranes to offload, transport, and stack International Standards Organization containers. Use of the Superstackers has provided increased safety and improved efficiency in the handling of these containers. Equipment needs and labor costs have been significantly reduced, while storage capability has been significantly increased.

Receiving Process **8**

SIAD implemented a new receiving process that locates the receiving clerk, storage planner, transportation clerk, and quality assurance inspector to the central receiving building. This new process reduced receiving processing times by 80%. The inventory accuracy and accountability have also been greatly improved.

Item	Page
Depot Integrated Budget System	**9**

The Depot Integrated Budget System is an automated system that manages and tracks all budget and cost data for the Depot, and was developed by SIAD utilizing a FoxPro software program. With this system, all budget information is submitted in a standardized format. The information is arranged in a user-friendly format and the Depot Integrated Budget System provides individualized reports and queries. The system is accessible from all areas of the Depot and can be used to develop trend analysis and projections.

Information

The following information items were documented at SIAD:

Item	Page
Sound Intensity Prediction System	**11**

When performing demilitarization on large quantities of highly explosive materials, a high level of atmospheric noise can propagate for more than 100 miles. To reduce the environmental and surrounding community impact, SIAD is adapting and implementing a Sound Intensity Prediction System developed by the U.S. Navy. The Sound Intensity Prediction System is an acoustic ray tracing computer code which calculates the locations of both noise enhancements and noise reductions from the conduct of explosive operations.

Conveyor System **12**

Realizing a need to automate its War Reserve Material and Operational Project Stock operations, SIAD obtained an automated conveyor system from the Defense Logistics Agency's excess equipment. By centralizing the storage of incoming material and automating the workstation delivery and return of this material, SIAD greatly reduced the need for additional material handling equipment.

Planning Guide **13**

SIAD hired a consultant to revise its planning system. All planning functions were centralized, and commodity teams were established which include the production planner, production controller, and supply manager. The new process supports changes in business practices, process improvements, and technology updates.

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Section 2

Best Practices

Design

Container Rotator

SIAD performs corrective maintenance on International Standards Organization Shelters and containers used in the storage and shipment of Operational Stock sets, kits, and outfits. SIAD designed and manufactured a container rotator to improve its ability to perform the corrective maintenance. The Depot has a patent pending on the design of the container rotator and has built container rotators for outside customers.

Prior to the use of container rotators, employees used a P&H Superstacker Crane, two forklifts, and wooden skids to elevate, support, and rotate containers. This process required eight moves for each container, and 12 material handling equipment moves. The average man-hours expended for repair of each container was 8.5. Due to the number and types of movements required in this process, employees were placed in awkward and potentially hazardous positions. Additionally, the containers were subject to increased damage due to the handling process.

SIAD recognized the need to develop a safe method to allow access to all sides of the containers while reducing the need for crane and forklift vehicles. In 1996, SIAD designed and built a towable container rotator (Figure 2-1). The shelters and containers are mounted to the container rotator by four locking mechanisms at the base of each shelter or container. The shelters and containers can be easily rotated and locked into position for safe access to all sides. The container rotator utilizes a pneumatic rather than a hydraulic piston to rotate the fixture. Because the container rotator is towable, the shelters and containers can be moved to welding, shot blasting, and painting locations without having to be removed.

The Depot has six container rotators on hand at a fabrication cost of approximately $10,000 each. Currently, two additional units are in production. SIAD has built and sold two units to outside customers. The units utilize all commercially available parts.

Use of the container rotator has greatly improved employee safety by eliminating awkward and potentially hazardous situations, and also improved hazardous waste recovery by increasing the control of spent shot blast residue. Use of the container rotator has reduced container moves by 50%; material handling equipment moves by 67%; personnel requirements by 67%; and repair cycle time from 8.5 hours to one hour. By using the container

Figure 2-1. Container Rotator

rotators, SIAD has provided a cost savings of more than 80% to its customers.

Production

Demilitarization Robot

SIAD obtained a High Agility Ground Accessible Robot (HAGAR), shown in Figure 2-2, for use in demilitarization operations of explosives and propellant. Use of the HAGAR has greatly improved operational safety and employee confidence.

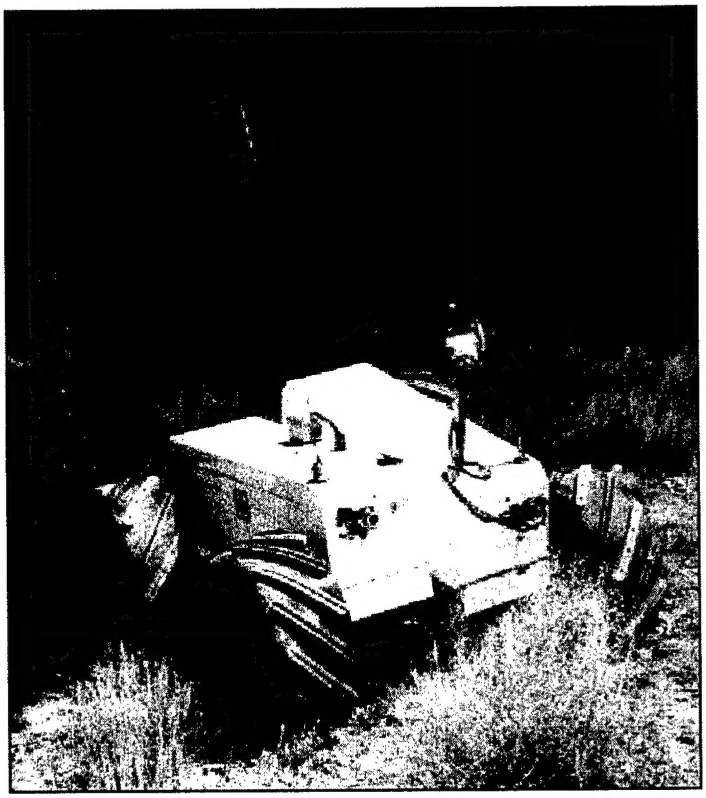

Figure 2-2. Demilitarization Robot

Previously, when a demilitarization process was interrupted by exposed wiring being cut by metal fragments or misfire, employees would observe the demilitarization pit for 30 minutes from a distance of 8,600 feet. The actual explosive material was not visible due to the configuration of the pit. If they observed no smoke during that time, an employee would enter the pit to determine the cause of the malfunction. Occasionally the explosives could still be burning without smoke, thereby placing the employee at great risk. If the explosives were found to be burning, the pit would be cleared to allow the explosives to self ignite or burn out, thus delaying the demilitarization of 10 to 20 tons of explosives. SIAD recognized the need to develop a quicker method to inspect the pits without endangering employees.

Working with Sandia National Laboratory's Robotic Division, SIAD obtained the HAGAR to allow remote inspection of the pits to determine misfire cause. The HAGAR provides remote visual inspection of the pits through a 24:1 zoom color camera. Employees view the explosives and munitions on a monitor from the safety of the firing bunker. Assessments of the situation are made without endangering personnel. The HAGAR is lightweight, portable, and user-friendly. Additionally, the HAGAR has only five moving parts and is supportable through the commercial market.

SIAD used the HAGAR 16 times in 1997, finding five instances of two cut firing lines. The benefits obtained through the use of the HAGAR include increased safety for employees, increased confidence during misfires, and increased production by reducing holdover detonations. SIAD has future plans for upgrades to the HAGAR which include cruise control, a wider field of view, and increased speed.

Facilities

Automated Scales

The number of containers being processed by SIAD has increased and as a result, a more efficient method was needed to reduce the amount of time required for handling, moving, and weighing the containers prior to shipment. Previously, a loaded container was moved from a building, loaded on a truck by a large forklift, and transported to a scale three miles away. There, it was weighed and returned another three miles to the building. At the building, the container was placed on pad scales to determine its center of balance. In addition to the equipment and time needed to load, move, and weigh the container, the process included an additional labor expense of five people charging a total of seven man-hours for each container processed. In order to improve this process, a new method has been developed resulting in reduced costs and increased throughput capacity.

Depot personnel provided valuable input toward the purchase of a new automated platform scale, designed

and built by Fairbanks Morse. This state-of-the-art scale is capable of simultaneously weighing the loaded container and determining its center of balance. A specific location of the container on the platform is not necessary; however, the container must be placed parallel with the platform to obtain the proper center of balance. A forklift and transport dolly are used to move the container onto the scale and return it to its proper location within the building after its weight and center of balance are obtained. The scale has an accurate capacity of 100,000 pounds and is connected to a personal computer that provides the operating personnel an automated printout. The printout lists the container's actual weight, length, width, and center of balance. The scale has a built-in calibration feature that is password protected and can only be accessed by qualified personnel when calibration is required. Use of this scale to weigh loaded containers requires three people charging a total of 1.5 man-hours, thereby reducing the cost to the customer by 5.5 man-hours per container, and eliminating the six-mile round trip of movement previously required; and reducing the material handling equipment and lost time of the actual move. While this scale is the first one of its kind to be built, it has met and exceeded the requirements set forth by SIAD. Procurement of additional scales is expected in the near future.

Figure 2-3. Superstacker

Superstacker

SIAD is a critical part of the Army's Industrial Operations Command and has a major mission in the handling, storing, and processing of War Reserve Materials and Operational Projects Stock. To maintain a competitive edge in this role, SIAD is continually finding ways to improve operations and provide its customers with the best service at a fair price. The procurement and use of the Superstacker is an example. In 1990, management recognized that a safer, cheaper, and more efficient method of handling the increasing number of cargo containers delivered to the Depot needed to be found. The methods in use at that time were much too slow and could not meet the levels of work that were being projected. On-site material handling equipment consisted of a 50-ton crane to lift and off-load the container from the railcars, and a 15-ton forklift to move the container to SIAD's storage location. Since a forklift was being used to move and stack the containers, the storage stacks could only be two high, resulting in the use of more storage space than necessary. There was also no method to remove a container from the middle of the storage stacks without moving all the other stacks in front of it.

To solve this problem, a decision was made in 1994 to procure a piece of equipment known as the Superstacker, manufactured by PBM Cranes, Inc. (Figure 2-3). This equipment combines the capabilities of both a crane and a transport vehicle and is capable of handling various sized containers without the need to make any manual configuration changes or adjustments. The Superstacker has the capacity to lift and move containers, weighing up to 100,000 pounds, and stack them four high if necessary. Current practice at SIAD is to use three-high stacks so that balk decking can be used to keep the bottom container off the ground for weather conditions.

Due to the success and savings obtained by the use of the Superstacker, SIAD procured an additional unit in 1996. The use of this equipment has provided SIAD a safer, more efficient method of unloading the ever increasing number of railcars, while at the same time providing a reduction in labor charges of 50% per container. By using one piece of handling equipment

for off loading, transporting, and storing, the need for additional material handling equipment and its corresponding maintenance requirements have been eliminated, and storage space at SIAD has increased because the Superstacker can stack the containers four high if necessary.

Logistics

Receiving Process

Due to a change in SIAD's mission, a new receiving process for incoming material has been implemented for the different types of material being received and the increased number of line items being processed. The new method has decreased processing times, improved accountability and accuracy, and improved communication among all personnel involved in the process.

The prior method of receiving required that all trucks report to one building. Quality Assurance (QA) personnel were called from another building to come and perform their receiving inspections. A Receipt Control Number (RCN) was then assigned, information was entered into the database, and copies of the forms were made at the receiving building. Damage In Transit (DIT) inspections were then performed by QA. An advance copy of the paperwork was then sent to receiving personnel in another building, and the original paperwork was given to field personnel. The field personnel recorded the final storage location of the material. The original documents, with the final storage location, were then returned to the central receiving building. The RCN slip was attached to the original receipt documents, and the documents were forwarded to the receiving personnel located in another building where the material was posted to record. The entire process took six to ten days to complete depending on the type of material and the research required for new items being received. Several times, the original paperwork was lost or misplaced and the inventory accuracy and accountability were not adequate. A customer had also requested that the receipt process be improved.

The new method, as shown in Figure 2-4, has all trucks arriving at the central receiving building where the Receiving Clerk, Storage Planner, Transportation, and QA Inspector have been centrally located. The DIT inspection is performed by QA in the

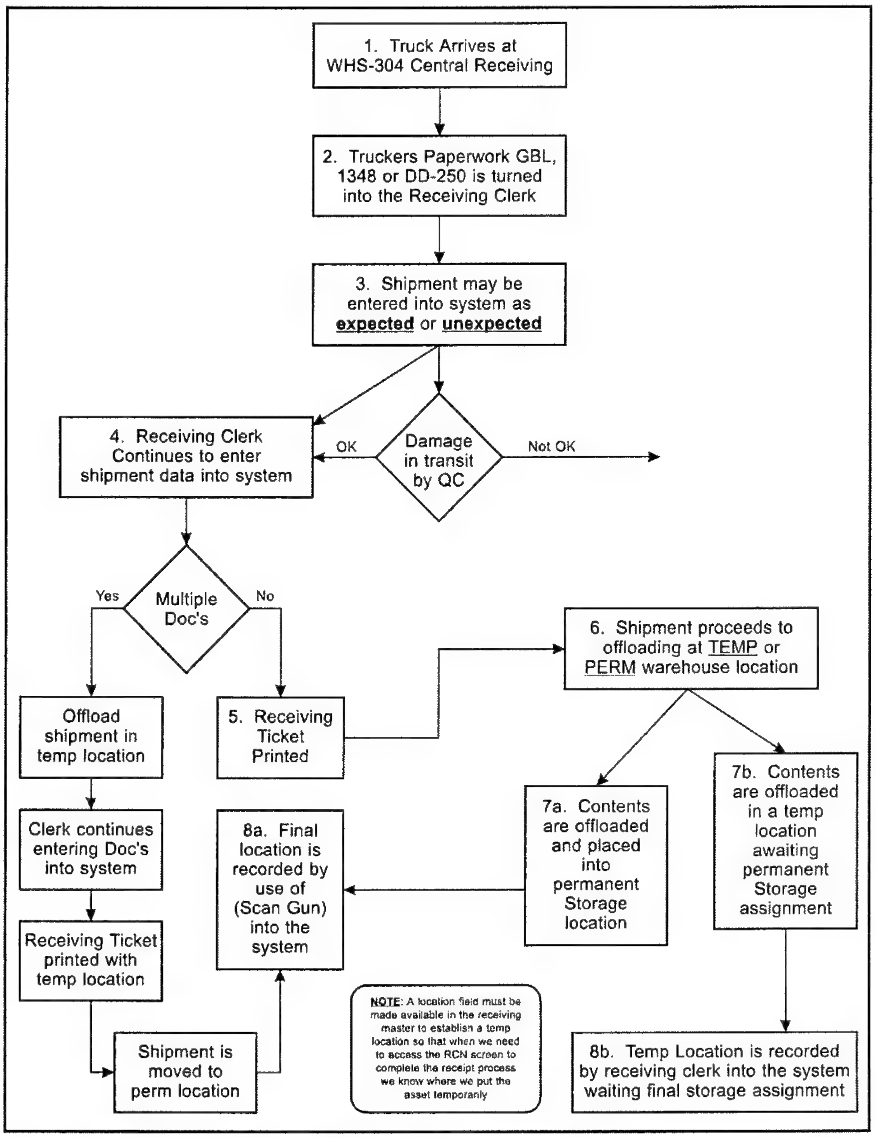

Figure 2-4. New Method Flow Chart

receiving building, a storage building location is assigned, the material is stored, and the receipt is posted. By having all personnel who are involved in the process located in the central receiving building, communication among the personnel has improved. The receiving time has been reduced by 80% to two days maximum. Inventory accuracy and accountability have also been dramatically improved. A local database is maintained for serial number control for unique customers who require it. Additional improvements are also being planned, such as use of the Sierra Total Asset Tracking System, incorporation of bar coding, and further reduction of the receiving process time by an additional 50%.

Management

Depot Integrated Budget System

The Depot Integrated Budget System (DIBS) is an automated system that manages and tracks all budget and cost data for the Depot. It is a FoxPro program developed in-house at SIAD. With DIBS, all budgets are submitted in the same format. The information is arranged in user-friendly formats and the system provides individualized reports and queries. It is accessible to all areas of the Depot and can be used to develop trend analysis and projections. The information is accurate and current, and is automatically retrieved in proper format into the Standard Depot System for transmission outside the Depot to higher level commands.

DIBS has been in use at SIAD for nearly one year. Prior to that time, no standard method of collection for budget and cost data existed between the directorates at the Depot. Planned and actual budget data was kept in individual spreadsheets and not shared among users. No communication vehicle existed to disseminate budget guidance and expense goals to the Directors which hampered the decision processes that were based on budget data and made it difficult to research costs and expenses. Management recognized the need to standardize budget development, provide all management levels with a method to easily manage expenses, streamline research, develop better decision making capability based on accurate and timely data, and develop quicker response time to higher level commands.

DIBS enabled the production of more current and accurate budgets, and is more responsive to user requirements than the previous system. The amount of time expended in developing budget data has been significantly reduced. Critical information is now shared and rapidly communicated across the Depot resulting in better informed decisions. The reduction of paperwork has greatly improved morale as well.

Section 3
Information

Test

Sound Intensity Prediction System

As part of its munitions demilitarization mission, SIAD has a contract with the U.S. Navy to destroy large missile rocket motors, such as Poseidon C-3 second stage motors. The motors contain large quantities of highly explosive materials, and can produce a high level of atmospheric noise when detonated. Depending on atmospheric conditions, this noise can propagate for more than 100 miles. To lessen the environmental impact and reduce the number of complaints from surrounding communities, SIAD is adapting and implementing a Sound Intensity Prediction System (SIPS) developed by the Navy.

SIPS is an acoustic ray tracing computer code that calculates the locations of both noise enhancements and noise reductions from the conduct of explosive operations. Originally, both the code and operational procedures for program interpretation were developed in the mid-1970s to manage noise generated by explosive operations at the Naval Surface Warfare Center in Dahlgren, Virginia. The original code was written in FORTRAN and required a mainframe computer to run. Now the program has been adapted to run on a personal computer, and modified to incorporate advancements in weather data sampling and the topography of the area of interest.

Monitoring atmospheric conditions involves a meteorological data collection system employing either radiosondes or Sonic Detection and Ranging Device (SODAR) technology to collect the upper air parameters. Radiosondes are carried aloft by helium-filled balloons so the scalar quantities of wet and dry bulb temperatures and atmospheric pressures can be retrieved. Since the balloon rides with the wind, radionavigation LORAN-C or the Global Positioning System must be employed to determine the balloon's location as a function of time, and subsequently render the upper air wind speed and direction as a function of altitude. SODAR has the advantage of less time between atmosphere soundings and describes the atmosphere directly above the unit, rather than at the balloon's location, but is limited to altitudes less than 20,000 feet. The atmospheric parameters needed as input to SIPS are collected by a single atmospheric sounding as near as possible to the noise event site. These parameters are considered valid for approximately one hour. Upon retrieval of the physical parameters, a model of the atmosphere is created as a series of stratified layers with constant horizontal properties. Each layer of the model represents a different linear sound speed gradient.

The output of the model includes ray trace diagrams showing atmospheric propagation paths, sound velocity profiles showing sound propagation velocity as a function of altitude, and geographic topography charts showing predicted sound intensity in decibels by geographic location. Figure 3-1 is an example of a sound velocity profile printout.

SIPS has been in use at SIAD for less than a year and is still in the early stages of characterizing the

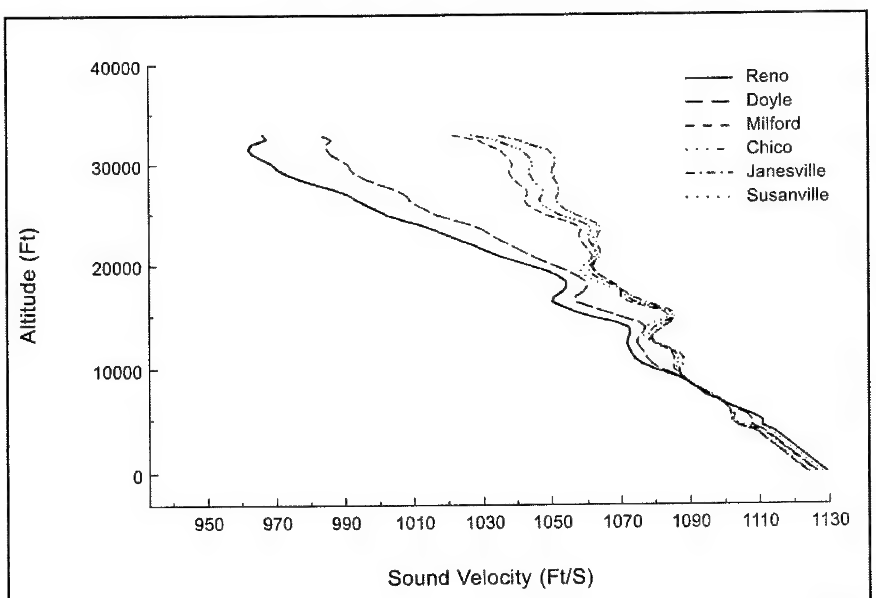

Figure 3-1. SIPS Sound Velocity Profile

local environment and validating the model's predictions. The next step in validating the SIPS model at SIAD is to install decimeters at various locations throughout the region surrounding the Depot to measure and verify the accuracy of the model's predictions. This is expected to take approximately one to two years.

Facilities

Conveyor System

A decision made by the BRAC 1995 committee resulted in SIAD transitioning its mission to support the increased handling and storing of War Reserve Material and Operational Projects Stock, and demilitarizing conventional munitions. To support this requirement, SIAD formed an in-house home improvement team. The team's goal was to upgrade existing facilities and equipment to a level that would support this increase in material handling, kitting, and storing and at the same time keep expenses for this change to a minimum. Prior to this, there was little need for any type of automated system to support the mission of SIAD. Therefore, no in-house, on-site resources were available to use for this upgrade of the material handling facilities. If automation was to occur, the necessary resources would have to be found elsewhere.

The team recognized that to be competitive in this new mission, an automated conveyor system would be required to handle the increase in the amount of material being processed by the Depot. The industrial processes in use needed to be examined and refined to eliminate or reduce the amount of handling or movement of the materials. The team would also have to ensure that materials delivered to a worksite were correct and received when needed. The team was able to find an existing excess conveyor system at Defense Distribution Depot in Ogden, Utah (Figure 3-2). By using this excess equipment, SIAD would be able to keep the cost of an automated conveyor system to a minimum. SIAD acquired the excess equipment and developed an automated conveyor system with six individual work stations. The conveyor system is capable of high capacity throughput of materials with minimum manipulation by other material handling equipment or personnel within the building. By centralizing the storage of the incoming material, automating the delivery of this material to the proper

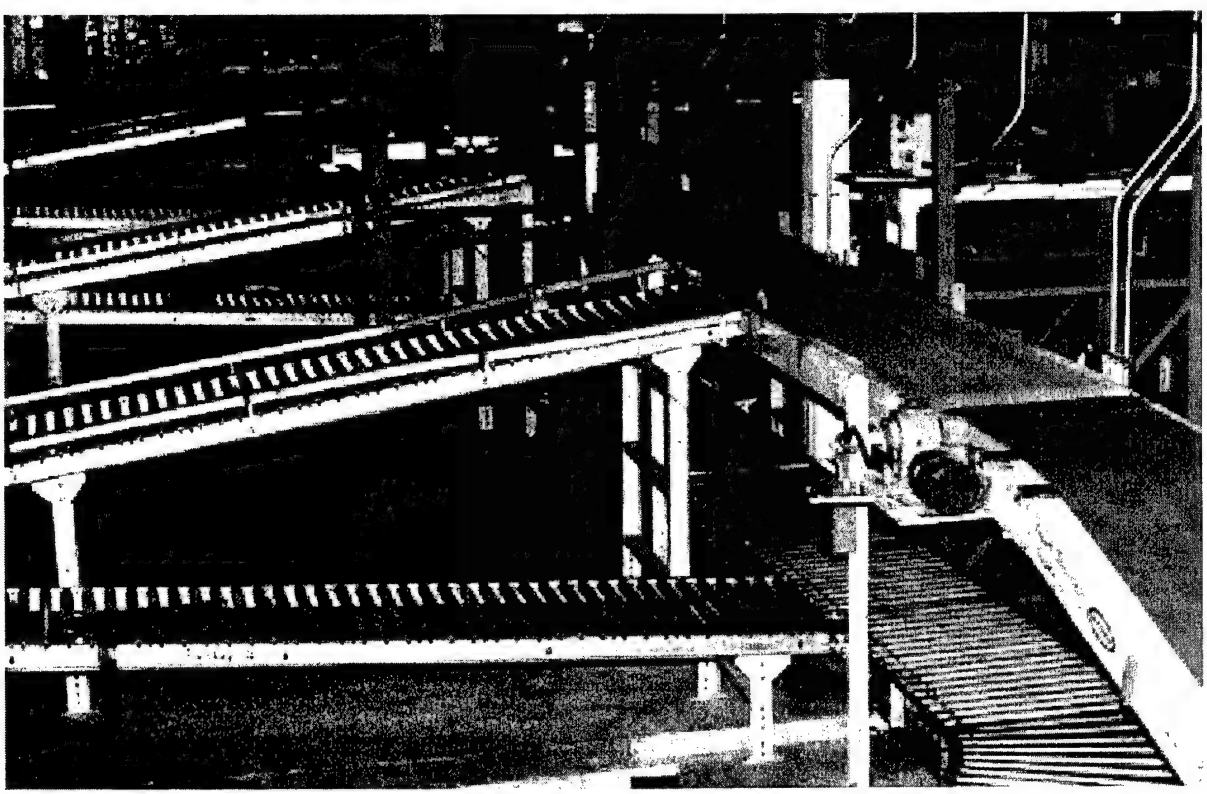

Figure 3-2. Conveyor System

workstation, and returning it to its proper storage location by means of the automated conveyor system, SIAD greatly reduced the need for any other in-house material handling equipment. The conveyor system is installed in building 301 and is currently coming on-line. After the necessary operator training and the programming of the six workstations, productivity levels are expected to increase five times over the previous methods used.

Management

Planning Guide

SIAD realized that it needed to revise its planning system after losing a competition for work from an existing customer. The prior system was decentralized, historical data was only haphazardly collected, no standardized documentation format existed, no interface with supply/parts tracking existed, and no automated processes were in place.

Dynamics Research Corporation was contracted to help develop the new process. Management recognized the need to centralize all planning functions, develop standard operating procedures, and develop standardized templates for forms. Management also knew that the Depot needed to keep pace with changing business practices to gain a competitive edge. Dynamics Research Corporation documented the previous process and the should-be process. All planning functions were centralized, and commodity teams were established which included the planner, controller, and supply. All processes were automated, and desktop procedures were developed for all processes.

The information is currently being loaded into the system. Once the information is loaded and the system is on-line, it is projected to have benefits such as more efficient management of resources and manpower, and lower costs for customers. The new process supports changes in business practices, process improvement, and technology updates.

Appendix A

Table of Acronyms

Acronym	Definition
DIBS	Depot Integrated Budget System
DIT	Damage In Transit
HAGAR	High Agility Ground Accessible Robot
QA	Quality Assurance
RCN	Receipt Control Number
SIAD	Sierra Army Depot
SIPS	Sound Intensity Prediction System
SODAR	Sonic Detection and Ranging Device

Appendix B
BMP Survey Team

Team Member	Activity	Function
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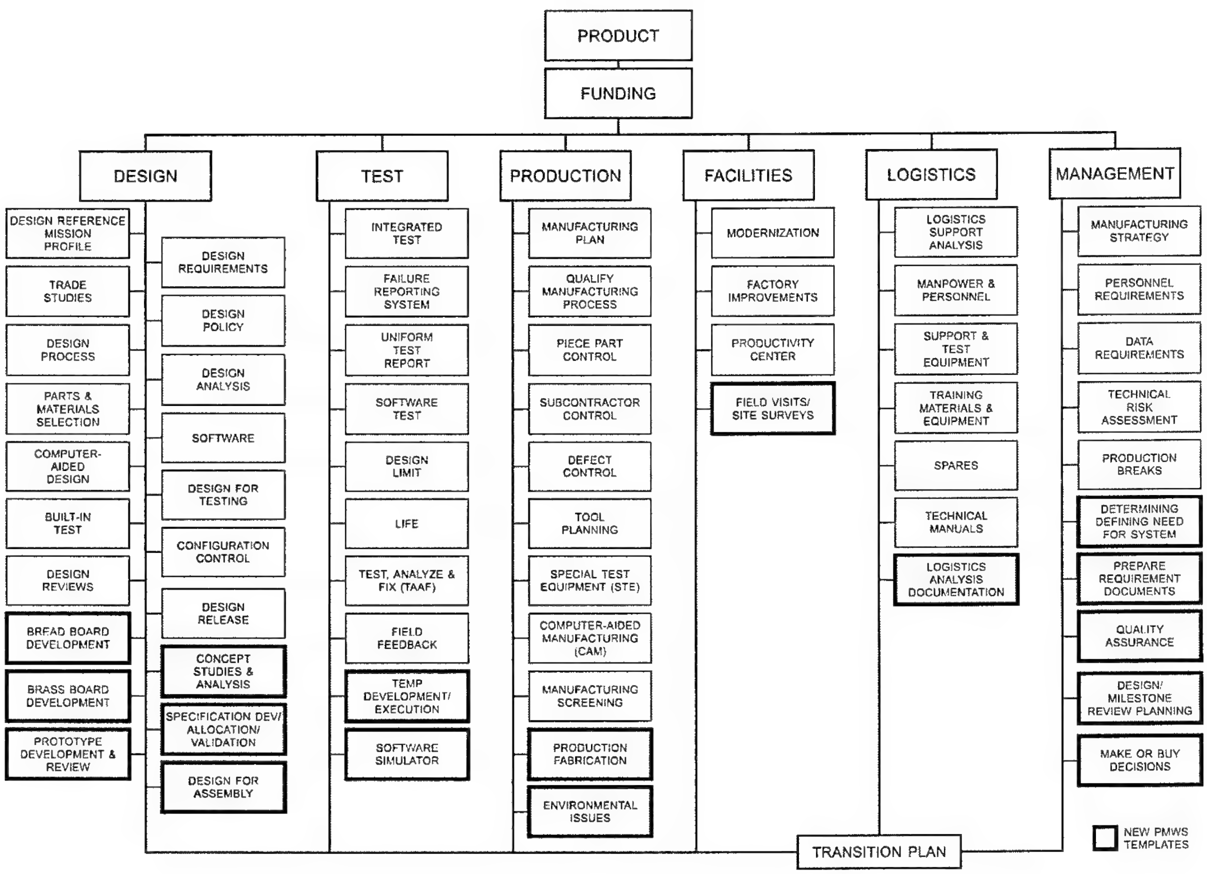
Appendix C

Critical Path Templates and BMP Templates

This survey was structured around and concentrated on the functional areas of design, test, production, facilities, logistics, and management as presented in the Department of Defense 4245.7-M, *Transition from Development to Production* document. This publication defines the proper tools—or templates—that constitute the critical path for a successful material acquisition program. It describes techniques for improving the acquisition process by addressing it as an *industrial* process that focuses on the product's design, test, and production phases which are interrelated and interdependent disciplines.

The BMP program has continued to build on this knowledge base by developing 17 new templates that complement the existing DOD 4245.7-M templates. These BMP templates address new or emerging technologies and processes.

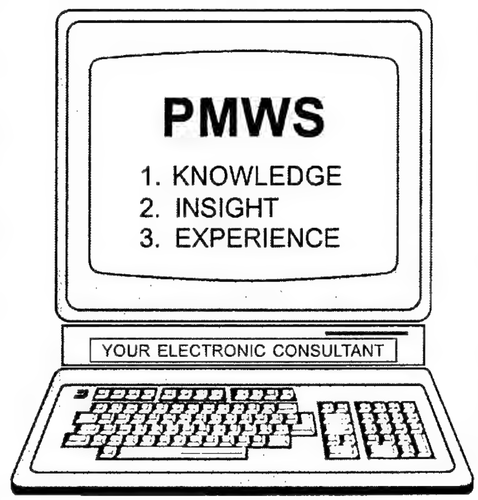
"CRITICAL PATH TEMPLATES FOR TRANSITION FROM DEVELOPMENT TO PRODUCTION"



Appendix D

BMPnet and the Program Manager's WorkStation

The BMPnet, located at the Best Manufacturing Practices Center of Excellence (BMPCOE) in College Park, Maryland, supports several communication features. These features include the Program Manager's WorkStation (**PMWS**), electronic mail and file transfer capabilities, as well as access to Special Interest Groups (SIGs) for specific topic information and communication. The BMPnet can be accessed through the World Wide Web (at http://www.bmpcoe.org), through free software that connects directly over the Internet or through a modem. The PMWS software is also available on CD-ROM.



PMWS provides users with timely acquisition and engineering information through a series of interrelated software environments and knowledge-based packages. The main components of PMWS are KnowHow, SpecRite, the Technical Risk Identification and Mitigation System (TRIMS), and the BMP Database.

KnowHow is an intelligent, automated program that provides rapid access to information through an intelligent search capability. Information currently available in KnowHow handbooks includes Acquisition Streamlining, Non-Development Items, Value Engineering, NAVSO P-6071 (Best Practices Manual), MIL-STD-2167/2168 and the DoD 5000 series documents. KnowHow cuts document search time by 95%, providing critical, user-specific information in under three minutes.

SpecRite is a performance specification generator based on expert knowledge from all uniformed services. This program guides acquisition personnel in creating specifications for their requirements, and is structured for the build/approval process. SpecRite's knowledge-based guidance and assistance structure is modular, flexible, and provides output in MIL-STD 961D format in the form of editable WordPerfect® files.

TRIMS, based on DoD 4245.7-M (the transition templates), NAVSO P-6071, and DoD 5000 event-oriented acquisition, helps the user identify and rank a program's high-risk areas. By helping the user conduct a full range of risk assessments throughout the acquisition process, TRIMS highlights areas where corrective action can be initiated before risks develop into problems. It also helps users track key project documentation from concept through production including goals, responsible personnel, and next action dates for future activities.

The **BMP Database** contains proven best practices from industry, government, and the academic communities. These best practices are in the areas of design, test, production, facilities, management, and logistics. Each practice has been observed, verified, and documented by a team of government experts during BMP surveys.

Access to the BMPnet through dial-in or on Internet requires a special modem program. This program can be obtained by calling the BMPnet Help Desk at (301) 403-8179 or it can be downloaded from the World Wide Web at http://www.bmpcoe.org. To receive a user/e-mail account on the BMPnet, send a request to helpdesk@bmpcoe.org.

Appendix E
Best Manufacturing Practices Satellite Centers

There are currently nine Best Manufacturing Practices (BMP) satellite centers that provide representation for and awareness of the BMP program to regional industry, government and academic institutions. The centers also promote the use of BMP with regional Manufacturing Technology Centers. Regional manufacturers can take advantage of the BMP satellite centers to help resolve problems, as the centers host informative, one-day regional workshops that focus on specific technical issues.

Center representatives also conduct BMP lectures at regional colleges and universities; maintain lists of experts who are potential survey team members; provide team member training; identify regional experts for inclusion in the BMPnet SIG e-mail; and train regional personnel in the use of BMP resources such as the BMPnet.

The nine BMP satellite centers include:

<ins>California</ins>

Chris Matzke
BMP Satellite Center Manager
Naval Warfare Assessment Division
Code QA-21, P.O. Box 5000
Corona, CA 91718-5000
(909) 273-4992
FAX: (909) 273-4123
cmatzke@bmpcoe.org

Jack Tamargo
BMP Satellite Center Manager
257 Cottonwood Drive
Vallejo, CA 94591
(707) 642-4267
FAX: (707) 642-4267
jtamargo@bmpcoe.org

<ins>District of Columbia</ins>

Chris Weller
BMP Satellite Center Manager
U.S. Department of Commerce
14th Street & Constitution Avenue, NW
Room 3876 BXA
Washington, DC 20230
(202) 482-8236/3795
FAX: (202) 482-5650
cweller@bxa.doc.gov

<ins>Illinois</ins>

Thomas Clark
BMP Satellite Center Manager
Rock Valley College
3301 North Mulford Road
Rockford, IL 61114
(815) 654-5515
FAX: (815) 654-4459
adme3tc@rvcux1.rvc.cc.il.us

<ins>Iowa</ins>

Bruce Coney
Program Manager
Iowa Procurement Outreach Center
200 East Grand Avenue
Des Moines, IA 50309
(515) 242-4888
FAX: (515) 242-4893
bruce.coney@ided.state.ia.us

<ins>Louisiana</ins>

Dr. Kenneth L. McManis
Director
Maritime Environmental Resources & Information Center
Gulf Coast Region Maritime Technology Center
University of New Orleans
810 Engineering Building
New Orleans, LA 70149
(504) 280-6271
FAX: (504) 280-5586
klmce@uno.edu

<ins>Michigan</ins>

Maureen H. Reilly
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Troy, MI 48084
(724) 772-8564
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755 W. Big Beaver Road, Suite 1600
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Pennsylvania

Sherrie Snyder
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MANTEC, Inc.
P.O. Box 5046
York, PA 17405
(717) 843-5054, ext. 225
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snyderss@mantec.org

Tennessee

Tammy Graham
BMP Satellite Center Manager
Lockheed Martin Energy Systems
P.O. Box 2009, Bldg. 9737
M/S 8091
Oak Ridge, TN 37831-8091
(423) 576-5532
FAX: (423) 574-2000
tgraham@bmpcoe.org

Appendix F

Navy Manufacturing Technology Centers of Excellence

The Navy Manufacturing Sciences and Technology Program established the following Centers of Excellence (COEs) to provide focal points for the development and technology transfer of new manufacturing processes and equipment in a cooperative environment with industry, academia, and Navy centers and laboratories. These COEs are consortium-structured for industry, academia, and government involvement in developing and implementing technologies. Each COE has a designated point of contact listed below with the individual COE information.

Best Manufacturing Practices Center of Excellence

The Best Manufacturing Practices Center of Excellence (BMPCOE) provides a national resource to identify and promote exemplary manufacturing and business practices and to disseminate this information to the U.S. Industrial Base. The BMPCOE was established by the Navy's BMP program, Department of Commerce's National Institute of Standards and Technology, and the University of Maryland at College Park, Maryland. The BMPCOE improves the use of existing technology, promotes the introduction of improved technologies, and provides non-competitive means to address common problems, and has become a significant factor in countering foreign competition.

Point of Contact:
Mr. Ernie Renner
Best Manufacturing Practices Center of Excellence
4321 Hartwick Road
Suite 400
College Park, MD 20740
(301) 403-8100
FAX: (301) 403-8180
ernie@bmpcoe.org

Center of Excellence for Composites Manufacturing Technology

The Center of Excellence for Composites Manufacturing Technology (CECMT) provides a national resource for the development and dissemination of composites manufacturing technology to defense contractors and subcontractors. The CECMT is managed by the Great Lakes Composites Consortium and represents a collaborative effort among industry, academia, and government to develop, evaluate, demonstrate, and test composites manufacturing technologies. The technical work is problem-driven to reflect current and future Navy needs in the composites industrial community.

Point of Contact:
Dr. Roger Fountain
Center of Excellence for Composites Manufacturing Technology
c/o GLCC, Inc.
103 Trade Zone Drive
Suite 26C
West Columbia, SC 29170
(803) 822-3705
FAX: (803) 822-3730
rfglcc@glcc.org

Electronics Manufacturing Productivity Facility

The Electronics Manufacturing Productivity Facility (EMPF) identifies, develops, and transfers innovative electronics manufacturing processes to domestic firms in support of the manufacture of affordable military systems. The EMPF operates as a consortium comprised of industry, university, and government participants, led by the American Competitiveness Institute under a CRADA with the Navy.

Point of Contact:
Mr. Alan Criswell
Electronics Manufacturing Productivity Facility
One International Plaza
Suite 600
Philadelphia, PA 19113
(610) 362-1200
FAX: (610) 362-1290
criswell@aci-corp.org

National Center for Excellence in Metalworking Technology

The National Center for Excellence in Metalworking Technology (NCEMT) provides a national center for the development, dissemination, and implementation of advanced technologies for metalworking products and processes. The NCEMT, operated by Concurrent Technologies Corporation, helps the

Navy and defense contractors improve manufacturing productivity and part reliability through development, deployment, training, and education for advanced metalworking technologies.

Point of Contact:
Mr. Richard Henry
National Center for Excellence in Metalworking Technology
c/o Concurrent Technologies Corporation
100 CTC Drive
Johnstown, PA 15904-3374
(814) 269-2532
FAX: (814) 269-2501
henry@ctc.com

Navy Joining Center

The Navy Joining Center (NJC) is operated by the Edison Welding Institute and provides a national resource for the development of materials joining expertise and the deployment of emerging manufacturing technologies to Navy contractors, subcontractors, and other activities. The NJC works with the Navy to determine and evaluate joining technology requirements and conduct technology development and deployment projects to address these issues.

Point of Contact:
Mr. David P. Edmonds
Navy Joining Center
1250 Arthur E. Adams Drive
Columbus, OH 43221-3585
(614) 688-5096
FAX: (614) 688-5001
dave_edmonds@ewi.org

Energetics Manufacturing Technology Center

The Energetics Manufacturing Technology Center (EMTC) addresses unique manufacturing processes and problems of the energetics industrial base to ensure the availability of affordable, quality, and safe energetics. The focus of the EMTC is on process technology with a goal of reducing manufacturing costs while improving product quality and reliability. The EMTC also maintains a goal of development and implementation of environmentally benign energetics manufacturing processes.

Point of Contact:
Mr. John Brough
Energetics Manufacturing Technology Center
Indian Head Division
Naval Surface Warfare Center
101 Strauss Avenue
Building D326, Room 227
Indian Head, MD 20640-5035
(301) 744-4417
DSN: 354-4417
FAX: (301) 744-4187
mt@command.ih.navy.mil

Institute for Manufacturing and Sustainment Technologies

The Institute for Manufacturing and Sustainment Technologies (iMAST), was formerly known as Manufacturing Science and Advanced Materials Processing Institute. Located at the Pennsylvania State University's Applied Research Labortory, the primary objective of iMAST is to address challenges relative to Navy and Marine Corps weapon system platforms in the areas of mechnical drive transmission techologies, materials science technologies, high energy processing technologies, and repair technology.

Point of Contact:
Mr. Henry Watson
Institute for Manufacturing and Sustainment Technologies
ARL Penn State
P.O. Box 30
State College, PA 16804-0030
(814) 865-6345
FAX: (814) 863-1183
hew2@psu.edu

National Network for Electro-Optics Manufacturing Technology

The National Netowork for Electro-Optics Manufacturing Technology (NNEOMT), a low overhead virtual organization, is a national consortium of electro-optics industrial companies, universities, and government research centers that share their electro-optics expertise and capabilities through project teams focused on Navy requirements. NNEOMT is managed by the Ben Franklin Technology Center of Western Pennsylvania.

Point of Contact:
Dr. Raymond V. Wick
National Network for Electro-Optics Manufacturing Technology
One Parks Bend
Box 24, Suite 206
Vandergrift, PA 15690
(724) 845-1138
FAX: (724) 845-2448
wick@nneomt.org

Gulf Coast Region Maritime Technology Center

The Gulf Coast Region Maritime Technology Center (GCRMTC) is located at the University of New Orleans and focuses primarily on product developments in support of the U.S. shipbuilding industry. A sister site at Lamar University in Orange, Texas focuses on process improvements.

Point of Contact:
Dr. John Crisp, P.E.
Gulf Coast Region Maritime Technology Center
University of New Orleans
College of Engineering
Room EN-212
New Orleans, LA 70148
(504) 280-3871
FAX: (504) 280-3898
jncme@uno.edu

Manufacturing Technology Transfer Center

The focus of the Manufacturing Technology Transfer Center (MTTC) is to implement and integrate defense and commercial technologies and develop a technical assistance network to support the Dual Use Applications Program. MTTC is operated by Innovative Productivity, Inc., in partnership with industry, government, and academia.

Point of Contact:
Mr. Raymond Zavada
Manufacturing Technology Transfer Center
119 Rochester Drive
Louisville, KY 40214-2684
(502) 452-1131
FAX: (502) 451-9665
rzavada@mttc.org

Appendix G
Completed Surveys

As of this publication, 107 surveys have been conducted and published by BMP at the companies listed below. Copies of older survey reports may be obtained through DTIC or by accessing the BMPnet. Requests for copies of recent survey reports or inquiries regarding the BMPnet may be directed to:

Best Manufacturing Practices Program
4321 Hartwick Rd., Suite 400
College Park, MD 20740
Attn: Mr. Ernie Renner, Director
Telephone: 1-800-789-4267
FAX: (301) 403-8180
ernie@bmpcoe.org

1985	Litton Guidance & Control Systems Division - Woodland Hills, CA
1986	Honeywell, Incorporated Undersea Systems Division - Hopkins, MN (Alliant TechSystems, Inc.) Texas Instruments Defense Systems & Electronics Group - Lewisville, TX General Dynamics Pomona Division - Pomona, CA Harris Corporation Government Support Systems Division - Syosset, NY IBM Corporation Federal Systems Division - Owego, NY Control Data Corporation Government Systems Division - Minneapolis, MN
1987	Hughes Aircraft Company Radar Systems Group - Los Angeles, CA ITT Avionics Division - Clifton, NJ Rockwell International Corporation Collins Defense Communications - Cedar Rapids, IA UNISYS Computer Systems Division - St. Paul, MN (Paramax)
1988	Motorola Government Electronics Group - Scottsdale, AZ General Dynamics Fort Worth Division - Fort Worth, TX Texas Instruments Defense Systems & Electronics Group - Dallas, TX Hughes Aircraft Company Missile Systems Group - Tucson, AZ Bell Helicopter Textron, Inc. - Fort Worth, TX Litton Data Systems Division - Van Nuys, CA GTE C^3 Systems Sector - Needham Heights, MA
1989	McDonnell-Douglas Corporation McDonnell Aircraft Company - St. Louis, MO Northrop Corporation Aircraft Division - Hawthorne, CA Litton Applied Technology Division - San Jose, CA Litton Amecom Division - College Park, MD Standard Industries - LaMirada, CA Engineered Circuit Research, Incorporated - Milpitas, CA Teledyne Industries Incorporated Electronics Division - Newbury Park, CA Lockheed Aeronautical Systems Company - Marietta, GA Lockheed Corporation Missile Systems Division - Sunnyvale, CA Westinghouse Electronic Systems Group - Baltimore, MD General Electric Naval & Drive Turbine Systems - Fitchburg, MA Rockwell International Corporation Autonetics Electronics Systems - Anaheim, CA TRICOR Systems, Incorporated - Elgin, IL
1990	Hughes Aircraft Company Ground Systems Group - Fullerton, CA TRW Military Electronics and Avionics Division - San Diego, CA MechTronics of Arizona, Inc. - Phoenix, AZ Boeing Aerospace & Electronics - Corinth, TX Technology Matrix Consortium - Traverse City, MI Textron Lycoming - Stratford, CT

1991	*Resurvey of Litton Guidance & Control Systems Division* - Woodland Hills, CA Norden Systems, Inc. - Norwalk, CT Naval Avionics Center - Indianapolis, IN United Electric Controls - Watertown, MA Kurt Manufacturing Co. - Minneapolis, MN MagneTek Defense Systems - Anaheim, CA Raytheon Missile Systems Division - Andover, MA AT&T Federal Systems Advanced Technologies and AT&T Bell Laboratories - Greensboro, NC and Whippany, NJ *Resurvey of Texas Instruments Defense Systems & Electronics Group* - Lewisville, TX
1992	Tandem Computers - Cupertino, CA Charleston Naval Shipyard - Charleston, SC Conax Florida Corporation - St. Petersburg, FL Texas Instruments Semiconductor Group Military Products - Midland, TX Hewlett-Packard Palo Alto Fabrication Center - Palo Alto, CA Watervliet U.S. Army Arsenal - Watervliet, NY Digital Equipment Company Enclosures Business - Westfield, MA and Maynard, MA Computing Devices International - Minneapolis, MN *(Resurvey of Control Data Corporation Government Systems Division)* Naval Aviation Depot Naval Air Station - Pensacola, FL
1993	NASA Marshall Space Flight Center - Huntsville, AL Naval Aviation Depot Naval Air Station - Jacksonville, FL Department of Energy Oak Ridge Facilities (Operated by Martin Marietta Energy Systems, Inc.) - Oak Ridge, TN McDonnell Douglas Aerospace - Huntington Beach, CA Crane Division Naval Surface Warfare Center - Crane, IN and Louisville, KY Philadelphia Naval Shipyard - Philadelphia, PA R. J. Reynolds Tobacco Company - Winston-Salem, NC Crystal Gateway Marriott Hotel - Arlington, VA Hamilton Standard Electronic Manufacturing Facility - Farmington, CT Alpha Industries, Inc. - Methuen, MA
1994	Harris Semiconductor - Melbourne, FL United Defense, L.P. Ground Systems Division - San Jose, CA Naval Undersea Warfare Center Division Keyport - Keyport, WA Mason & Hanger - Silas Mason Co., Inc. - Middletown, IA Kaiser Electronics - San Jose, CA U.S. Army Combat Systems Test Activity - Aberdeen, MD Stafford County Public Schools - Stafford County, VA
1995	Sandia National Laboratories - Albuquerque, NM Rockwell Defense Electronics Collins Avionics & Communications Division - Cedar Rapids, IA *(Resurvey of Rockwell International Corporation Collins Defense Communications)* Lockheed Martin Electronics & Missiles - Orlando, FL McDonnell Douglas Aerospace (St. Louis) - St. Louis, MO *(Resurvey of McDonnell-Douglas Corporation McDonnell Aircraft Company)* Dayton Parts, Inc. - Harrisburg, PA Wainwright Industries - St. Peters, MO Lockheed Martin Tactical Aircraft Systems - Fort Worth, TX *(Resurvey of General Dynamics Fort Worth Division)* Lockheed Martin Government Electronic Systems - Moorestown, NJ Sacramento Manufacturing and Services Division - Sacramento, CA JLG Industries, Inc. - McConnellsburg, PA
1996	City of Chattanooga - Chattanooga, TN Mason & Hanger Corporation - Pantex Plant - Amarillo, TX Nascote Industries, Inc. - Nashville, IL Weirton Steel Corporation - Weirton, WV NASA Kennedy Space Center - Cape Canaveral, FL Department of Energy, Oak Ridge Operations - Oak Ridge, TN

1997	Headquarters, U.S. Army Industrial Operations Command - Rock Island, IL SAE International and Performance Review Institute - Warrendale, PA Polaroid Corporation - Waltham, MA Cincinnati Milacron, Inc. - Cincinnati, OH Lawrence Livermore National Laboratory - Livermore, CA Sharretts Plating Company, Inc. - Emigsville, PA Thermacore, Inc. - Lancaster, PA Rock Island Arsenal - Rock Island, IL Northrop Grumman Corporation - El Segundo, CA *(Resurvey of Northrop Corporation Aircraft Division)* Letterkenny Army Depot - Chambersburg, PA Elizabethtown College - Elizabethtown, PA Tooele Army Depot - Tooele, UT
1998	United Electric Controls - Watertown, MA Strite Industries Limited - Cambridge, Ontario, Canada Northrop Grumman Corporation - El Segundo, CA Corpus Christi Army Depot - Corpus Christi, TX Anniston Army Depot - Anniston, AL Naval Air Warfare Center, Lakehurst - Lakehurst, NJ Sierra Army Depot - Herlong, CA

INTERNET DOCUMENT INFORMATION FORM

A . Report Title: Best Manufacturing Practices: Report of Survey Conducted at Sierra Army Depot, Herlong, CA

B. DATE Report Downloaded From the Internet: 12/20/01

C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #): **Best Manufacturing Practices**
Center of Excellence
College Park, MD

D. Currently Applicable Classification Level: Unclassified

E. Distribution Statement A: Approved for Public Release

F. The foregoing information was compiled and provided by:
DTIC-OCA, Initials: __VM__ **Preparation Date 12/20/01**

The foregoing information should exactly correspond to the Title, Report Number, and the Date on the accompanying report document. If there are mismatches, or other questions, contact the above OCA Representative for resolution.